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Drawing attached.

COMPLETE SPECIFICATION.

"IMPROVEMENTS IN OR RELATING TO SHOEMAKERS' LASTS."

The following statement is a full description of this invention, including the best method of performing it known to us :

This invention relates to shoemakers' lasts.

In the normal process of manufacturing shoes with leather soles, as distinguished from those having vulcanized soles, the last is generally constructed of wood and is so designed that the heel portion may be pivoted on the fore part portion thus causing a shrinking or decrease in the overall length so that the last may be removed from the shoe which has been formed around it.

Such prior types of last have usually been made of a single piece of hard and fine grained wood and have generally been divided, for example by a band-saw or similar tool, into two portions which are pivoted to allow such relative movement as is necessary to permit withdrawal of the last from the completed shoe.

Prior types of last have generally achieved such pivoting motion by employing one or more metal links retained at or adjacent their extremities by a plurality of pins, the links and associated pins being so disposed that the relative rotation of the heel and fore part portions will result in a general longitudinal contraction of the last as a whole.

Blocks from which lasts are made contain a substantial excess of wood so that a variety of heights of heels and widths of fittings may be formed from each block. Usually one particular length of block will provide only for a limited number of sizes, there being four or five blocks required to cover the full range of children's, women's, and men's lasts.

The comparatively large volume of the blocks hitherto generally found necessary presents difficulties in drying the wood to a moisture content of the required uniformity

or homogeneity.

Thus in the past difficulty has often been experienced in obtaining lasts, particularly when cut from the inner portion of the block, which will not deform by changing shape in excess of prescribed limits, due to absorption of atmospheric moisture.

Furthermore, it has hitherto been generally found that unless the position of the pins associated with the links mutually retaining the heel and fore part portions is closely controlled, difficulty is experienced in effecting the pivoting movement necessary prior to removal of the last, and an attempt to do so may cause a breakage in the wood, especially in the region of the pins and links, thus resulting in a high percentage of reject lasts and hence a substantial wastage of material. Should the pins however be too far apart, the assembly comprising the fore part and heel portions will be excessively loose causing inadequate support of the shoe during processing operations.

The primary object of this invention is to provide a last which is readily adaptable to mass production, and which will permit a similar cross section of timber to be used for the heel and fore part sections and which will enable reduced stocks of last blocks to be held as a standard timber section to be used for both the heel and fore part sections.

Another object is to provide a last which will allow a greater degree of mechanical precision of the portions in the rough state by machines being more readily capable of gripping the regularly shaped wood sections.

Another object is to provide a method of producing a last, which method materially reduces the amount of labour and time hitherto generally required in the production of known types of last.

Further objects of the present invention are to reduce the problem of drying and also the cost and time of manufacture by having less timber to remove in the roughing and finishing operations.

The above and other objects and advantages of the invention will become apparent hereinafter.

Accordingly the present invention provides an improved last comprising a wooden fore part, a wooden heel part and two intermediate portions, moulded from plastic material, which are secured at their remote ends to said fore part and said heel part respectively, and are interconnected at their facing ends to enable the last to be "broken" preparatory to removal of a lasted shoe therefrom.

It is preferred that the wooden fore part and the wooden heel part have tongues or like portions projecting rearwardly and forwardly, respectively, the intermediate portions being moulded so as to fill the gaps between the tongues and thus bond the intermediate portions to their respective wooden parts. This embodiment thus provides a large interface between the heel and fore parts and their associated intermediate portions, and hence a large bonding surface, whose area depends upon the number and depth of the tongues.

The present invention further provides a method of producing a last, comprising moulding the two intermediate portions from plastic material, adhesively mounting each said portion on a wooden block, linking the plastic portions so as to allow limited relative movement therebetween, and shaping the blocks and their associated plastic portions into a last with one block forming a heel part and the other, a fore part, the extent of said relative movement being sufficient to allow for "breaking" the last.

By "breaking" the last, is meant causing such relative movement of its component parts from their operative or "unbroken" position, as is necessary to withdraw a lasted shoe from the last. Such movement may be substantially translational, using, for example, a planar interface between the intermediate portions, or may involve a relative rotation between the

components, the latter being achieved when a curved interface is employed. In any event, it is highly desirable to provide a "toggle" action between the operative and inoperative positions, that is, an action such that although the last is stable in either position, a substantial amount of force is required to "break" or "unbreak" it.

The pivot portions may be moulded to close tolerances thereby permitting a greater control over the tension mutually retaining the heel and fore part sections.

But in order that the invention may be better understood reference will now be made to the accompanying drawing which is to be considered as part of this specification and read therewith.

Figure 1 shows a preferred form of last in accordance with this invention, in its "operative" position.

Figures 2 to 6 inclusive illustrate various representative steps in a preferred embodiment of the process provided by the present invention.

The last illustrated in figure 1 includes a wooden fore part 7 having rearwardly extending tongues 8 with intervening gaps 9, and a wooden heel part 10 with forwardly extending tongues 11 spaced by intervening gaps 12. Two intermediate portions 13, 14 associated respectively with parts 7 and 10 are plastic mouldings, the plastic material filling the gaps between the tongues so as to bond the intermediate portions 13, 14 to their respective wooden parts 7, 10.

Each intermediate plastic portion has a cavity suitably located to accommodate link means for interconnecting them. The cavity, in the drawing visible in the forward portion only, advantageously comprises a transverse bore 15 communicating with a longitudinal recess 16, the recesses having apertures oppositely disposed in the facing ends 17, 18 of the intermediate portions, and the link means comprising a link 19 perforated adjacent its ends by perforations 19a, 19b the link being adapted to bridge the intermediate portions. Each transverse bore 15 is fitted with a pin, the pins passing through perforations 19a, 19b so that the interconnection affords a toggle-action between the operative and broken positions of the last.

The last is advantageously provided with a metal, fibre or leather strip 28 located on an upper surface of the heel part 10 and corresponding intermediate portion 14, this strip forming a strengthening base for a thimble-receiving shaft 29. When it is desired to break or "unbreak" the last a thimble may thus be readily inserted to retain the heel part in a substantially fixed position, while the fore part is moved relatively to it.

Referring now in particular to figures 2 and 3, a preferred method of forming a last comprises shaping end parts 20, 21 of two wooden blocks into a plurality of tongues 22, 23 respectively, the projections being spaced by intervening gaps 24, 25 respectively. Moulds (not shown) having appropriate moulding faces are mounted so as to overlie the shaped end parts, and plastic material is compressively injected into each mould so that the material fills the gaps 24, 25 to provide a gripping relationship between the moulding and the associated block. Such moulding will in almost every case involve a deformation of the tongues in the respective wooden block, and the irregularities introduced materially assist the bonding adhesion between the moulding and the corresponding block.

Each mould has provision for leaving in the resultant moulding a cavity comprising a transverse bore communicating with a longitudinal recess (indicated by the dotted lines), to accommodate link means for interconnection of the plastic portions. The moulded face of the mould is such that the resultant plastic mouldings will each be provided with a bearing surface, e. g., 26, shaped complementarily to a bearing surface 27 on the other moulding so that during the relative movement of the portions connected by the link means, the complementary bearing surfaces 26, 27 remain substantially in contact.

When the plastic material has set to the required degree the moulds are removed and the link means engaged whereby the plastic portions together with their associated blocks are connected as shown in figure 6.

It may be desirable to mould one of the plastic portions with its pin already in position passing through the link. In this case the plastic portions may be connected simply by placing these portions adjacent one another with their complementary surfaces 26, 27 in engagement and the link positioned in both recesses. To complete the connection it now only remains to insert the pin in the other intermediate portion so as to pass through the vacant perforation in the link 19. The structure shown in figure 6 is then shaped into the desired form of last with one block, for example 21, forming the fore part 7 and the other 20, the heel part 10.

It will be apparent from the above that the present invention will allow similar cross sections of timber to be used for the heel and fore part sections thus effecting a substantial saving in time.

The invention will also enable reduced stocks of last blocks to be used as the standard section of timber employed for both heel and fore part sections and will permit of an improved degree of mechanical precision of the portions in the rough state by machines being more readily capable of gripping the timber sections. Furthermore, the number of machine operations hitherto required in forming the pivot portion, and also the problems associated with drying, are materially reduced.

In addition, those portions of the last whose shape must be precisely controlled may be readily mass produced and the overall cost of manufacture is substantially reduced, since there is now less timber to be removed, in the roughing and finishing operations.

The claims defining the invention are as follows :

1. An improved last comprising a wooden fore part, a wooden heel part and two intermediate portions, moulded from plastic material, which are secured at their remote ends to said fore part and said heel part respectively, and are interconnected at their facing ends to enable the last to be "broken" preparatory to removal of a lasted shoe therefrom. (5th February, 1960).

2. An improved last comprising a wooden fore part having tongues projecting rearwardly therefrom and forming intervening gaps, a wooden heel part having tongues projecting forwardly therefrom and forming intervening gaps, and two intermediate portions, moulded from plastic material so that parts thereof fill the gaps between the projecting tongues of the fore part and the heel part and bond the intermediate parts to the fore part and the heel part, said intermediate portions being interconnected at their facing ends to enable the last to be broken preparatory to removal of a lasted shoe therefrom. (5th February, 1960).

3. A last as claimed in claim 1 or claim 2 wherein the facing ends of the intermediate portions are provided with complementary bearing surfaces which remain substantially in contact irrespective of whether the last is in an operative or broken position. (5th February, 1960).

4. A last as claimed in any one of the preceding claims, wherein each intermediate portion has a cavity accommodating link means interconnecting said portions, each cavity comprising a transverse bore communicating with a longitudinal recess, the recesses having apertures oppositely disposed in the facing ends of the intermediate portions, and the link means comprising a perforated link bridging said portions and a pin fitted in each bore, the

arrangement being such that the interconnection affords a toggle action between the operative and broken positions of the last. (5th February, 1960).

5. A last substantially as herein described and as illustrated in Figure 1 of the accompanying drawing. (5th February, 1960).

6. A method of producing a last, comprising moulding two intermediate portions from plastic material, mounting each said portion on a wooden block, linking the plastic portions so as to allow limited relative movement therebetween, and shaping the blocks and their associated plastic portions into a last with one block forming a heel part and the other, a fore part, the extent of said relative movement being sufficient to allow for breaking the last. (5th February, 1960).

7. A method of producing a last, comprising shaping two blocks of wood to provide on each a surface adapted to register with a surface of an associated intermediate last region, moulding from plastic material an intermediate portion for association with each block, each intermediate portion having a cavity comprising a transverse bore adapted to receive a pin, the bore communicating with a longitudinal recess, the recesses of the respective intermediate portions when placed in registration being arranged to accommodate a link bridging the intermediate portions, the link being perforated adjacent each of its ends to receive the pins, one of the pins and the link being moulded in situ in one of the intermediate portions with said one pin being received in one of the perforations of the link, the intermediate portions each having a bearing surface shaped complementarily to a bearing surface on the other intermediate portion so that during relative movement of the portions the complementary bearing surfaces remain substantially in contact, removing the moulds when the moulded intermediate portions have solidified, connecting the intermediate portions by bringing said portions together so that the link is received also in the cavity of the other intermediate portion, inserting the other pin in the transverse bore of the cavity in the lastmentioned portion, and shaping the structure comprising the blocks and solidified intermediate portions into the desired form of last, one block forming a fore part of said last, and the other, the heel, the extent of relative movement between each intermediate portion with its associated block and the other portion and block being sufficient to allow for breaking the last. (5th February, 1960).

8. A method of producing a last, comprising shaping an end part of each of two blocks of wood into a plurality of tongues with intervening gaps, moulding on each shaped end part an intermediate portion of plastic material by mounting a mould so as to overlie the end part of the corresponding block, injecting and compressing the plastic material into the mould so as to fill the gaps and provide a gripping relationship between the completed moulding and associated wooden block, each mould having provision for leaving in the resulting moulding a cavity suitably located to accommodate link means whereby the intermediate portions are adapted to be connected in movable relationship, said moulded portions each having a bearing surface shaped complementarily to a bearing surface on the other moulded portion so that during relative movement of the portions the complementary bearing surfaces remain substantially in contact, removing the moulds when the moulded intermediate portions have solidified, connecting the intermediate portions and shaping the structure comprising the blocks and solidified intermediate portions into the desired form of last, one block forming a fore part of said last, and the other, the heel, the extent of relative movement between each intermediate portion with its associated block and the other portion and block being sufficient to allow for breaking the

last. (5th February, 1960).

9. A method of producing a last, comprising shaping an end part of two blocks of wood into a plurality of tongues with intervening gaps, moulding from plastic material an intermediate portion for association with each block, each intermediate portion having a plurality of tongues with intervening gaps adapted to fit into, and receive, respectively, the gaps and tongues in the corresponding block, a cavity suitably located to accommodate link means whereby the intermediate portions are adapted to be connected in rotatable relationship, and a bearing surface shaped complementarily to a bearing surface on the other intermediate portion so that during relative movement of the portions the complementary bearing surfaces remain substantially in contact, adhesively mounting each intermediate portion to the corresponding block, connecting said intermediate portions and shaping the structure comprising the connected portions and blocks into the desired form of last, one block forming a fore part of said last and the other, a heel part, the extent of relative movement between each intermediate portion and block being sufficient to allow for breaking the last. (5th February, 1960).

10. A last produced by a method as claimed in any one of claims 6 to 9. (5th February, 1960).

11. A method of producing a last, substantially as herein described and illustrated in Figures 2 to 6 of the accompanying drawing. (5th February, 1960).

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References: Nil.

